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BIOLOGICAL EVALUATION OF PINE ENGRAVER (PINE BARK BEETLE) ON THE HURON-MANISTEE NATIONAL FORESTS - 1966

By Imants Millers, Entomologist

A. INTRODUCTION

The pine engraver, frequently called pine bark beetle, is a common pest of sapling and pole size pines. Usually, its damage is found in small pockets around pulpwood left in the woods during summer and near trees killed or weakened by snow, ice, or animal damage.

The current outbreak is more severe than previous years. Pine cutting, has provided ample breeding material, and the lack of rainfall during May and June, apparently, predisposed standing pines to beetle attack.

The biological evaluation concludes with the following recommendations:

1. Salvage all killed, merchantable, pine where it is economically feasible.

2. Make an intensive review of all bark beetle literature to establish what is known about Ips pini.

3. Establish an administrative study to determine emergence flights and development of beetles in Michigan.

4. Develop cutting methods that will reduce chances of bark beetle build-up.

B. TECHNICAL INFORMATION

1. Causal Agent:

   Pine Engraver, or Pine Bark Beetle, Ips pini (Say)

2. Host Trees:

   Red Pine, Pinus resinosa Ait.
   Jack Pine, Pinus banksiana Lamb.

3. Type of Damage:

   The pine engraver tunnels in the inner bark and newly formed xylem, thus girdling the tree. Partial attacks cause dead areas on side of a trunk, or result in top kill of pine. The most conspicuous damage is the complete kill of young pine in pockets from few to several hundred trees. Younger pines, 5-25 year old, appear most susceptible, but occasionally older pines are killed too.

4. Biological Data:

The most recent life history study of Ips pini was made by Thomas (1961) in northwestern Ontario. He found that the beetles overwinter in soil, emerge in late May when temperatures exceed 45° F. The overwintering beetles may produce two broods, and possibly one combination brood with emerging second generation adults. Two generations and a partial third occurred in Ontario, however, the latter died out during the winter.

Other life history studies are reviewed by Craighead (1950) and Graham and Knight (1965). Apparently, in some areas the beetles overwinter on the tree, and may survive in larval and pupal stages. Also, up to six generations a year may occur, with about 40 days required for egg to adult.

Examinations on the Huron-Manistee National Forests indicate that the beetles overwinter in the soil. Slash accummulated after August does not appear to receive beetle attacks. Other life history data is not available, but should be determined as soon as possible.

5. Environmental Data:

Traditionally, the pine engraver is considered a weak parasite that becomes a pest only when unusual conditions weaken the tree resistance. Its normal breeding sites are dead or dying pines, such as caused by windrow, ice-damage, animal or insect damaged, or cut during harvest. However, when beetle populations increase in favorable breeding material, they may attack nearby standing pines. Few dead pines are common sight around pulpwood piles left in the woods during the summer. Similarly, cut sawlog-trees have large tops that build up beetle populations that kill nearby small pines. Beetle attacks are expected to be more successful during growing seasons with rainfall shortage.

The current beetle outbreak was favored by most of the conditions discussed before. Many of the small pockets are near trees killed or weakened by some other cause. The larger infestations are associated with pine thinnings or cleanings. However, frequently pockets of young pine are killed by bark beetles where suitable breeding material is not available for large distances. These last three types of beetle outbreaks appear to be favored by timber cutting activities and prevention of excessive losses may be possible.

The Cadillac outbreak in Section 2, T22N, R11W, is in a red pine plantation being row thinned. The first operator had cut the wood and stacked in small 5-10 stick piles along the cut row. The cut wood had remained in the field all summer of 1966. The beetle pockets are scattered throughout the area - cut and uncut portions, and do not appear to be associated with the wood piles.

Different conditions exist in the Kellogg plantation block. About 30 year old red pine - jack pine plantations are thinned to favor red pine as the final product. The cut wood was removed quickly, but the bark beetle build-up, apparently, occurred in the slash. In this area, single tree mortality is scattered throughout, with pockets of more than 30% tree mortality occurring on hill tops. The theorized cause here is the heavy thinning that left an open stand of weak red pine.

The greatest bark beetle kill is observed near Welcome Lake, Tawas RD. The area has large red pine plantations planted during 1930's. Natural jack pine is scattered throughout the red pine, occurring as individual trees, small pure-stand pockets, and large, more than 10 acre, jack pine stands. The jack pine is being cut from all these areas. The result is clearcut large areas of jack pine near the red pine, clearcut pockets of acre and less within the plantations, and cleaning of the scattered jack pine within the red pine. The pine is cut from September through May. During summer, cutting is primarily in aspen, to utilize easy peeling. The wood is, usually piled in large stacks and removed within few months. However, occasional stacks remain for 6-9 months during summer. The bark beetle pockets occur in the red pine within or in the vicinity of cutting areas. These pockets do not appear to be the result of piled wood.

It is theorized that the bark beetle population build-up in the slash cut during 1965-66 winter and spring. Then by July the slash had deteriorated and new slash was not available, thus the beetles were forced to attack standing red pine.

The last bark-beetle problem situation is the outbreak, or kill, among young 5-20 year old red pines, away from abundant beetle breeding material. Usually, a few dozen to several hundred trees are killed in a pocket in one year, but only a few or more the following season. The largest such pocket occurs on Harrisville RD, where more than an acre was killed. There, the nearest pine cutting area is 6 miles away. Thus, no reasonable explanation is available for such an outbreak.

The weather may be the most important factor contributing to the success of bark beetle attacks onto standing pines. Examination of rainfall data for the past 10 years reveals frequent years of water shortage. Annual rainfall occurred below average 6 out of the last 10 years, and the current year may become the driest ever. Even more critical may be the water shortage during the growing season, since the sandy pine soils do not have much water holding capacity. In the last 10 years, five had below average rainfall in May, eight were below average in June and four had both May and June below average. The current year experienced practically no rainfall in these two months. Thus, the trees were, probably, in very susceptible condition to bark beetle attacks in 1966.

In summary, the current bark beetle outbreak appears to be the result of build-up of favorable breeding material as a result of pine cutting, and coupled with severe attacks on standing timber. However, the climatic records indicate that the drouth periods occur frequently, and losses from bark beetle damage will occur unless bark beetle build-up can be prevented.

6. Location and Intensity of Outbreak:

Bark beetle attacks appear to be present annually, although fluctuations in number of loci occur. Generally, as well as during 1966, bark beetles attack from few trees to several dozen in one locus. Usually, these pockets are related to porcupine damage, snow-breakage, armillaria root rot or miscellaneous cutting of pines. Few outbreaks are reported annually, that do not appear to be near any type of natural breeding material. These pockets range from few dozen trees to more than a hundred pines, aged from 10-20 years. Similar pockets were observed in 1966.

The current outbreak of bark beetles is most severe where some type of cutting is done nearby. On the Cadillac RD three thinning areas were detected from aerial flights, that had more than a 100 trees each killed by the bark beetles. The most severe kill, however, is reported from Tawas RD. There, between 100-200 cords of pole-size plantation red pine is killed, as estimated by the Ranger. Apparently, clear-cutting in vicinity, and removal of merchantable jack pine within the plantation encouraged the outbreak. Maps 1 and 2 show bark beetle pockets on the Huron-Manistee National Forests.

DISCUSSION AND RECOMMENDATIONS

The pine engraver, or pine bark beetle, perhaps kills more pines than any other insect on the Forest. Unfortunately, outbreaks occur in small pockets which seldom expand in size. Current detection methods reveal the outbreaks from the appearance of dead trees, and thus, are too late to prevent tree mortality. The scattered nature of the outbreak pockets also makes it impractical to control the pest. However, outbreaks associated with plantation thinnings or cleanings are more severe and prevention and control may be practical. This will require analysis of available knowledge on Ips pini, determine the life history of the beetle in Michigan, and then develop prevention methods. Thus, the following recommendations are made:

1. Salvage all killed merchantable pine where it is economically feasible.

2. Make an intensive review of all bark beetle literature to determine what is known about Ips pini.

3. Establish an administrative study to determine emergence flights and development of beetle in Michigan.

4. Develop cutting methods that will reduce chances of bark beetle build-up.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE REGION 9

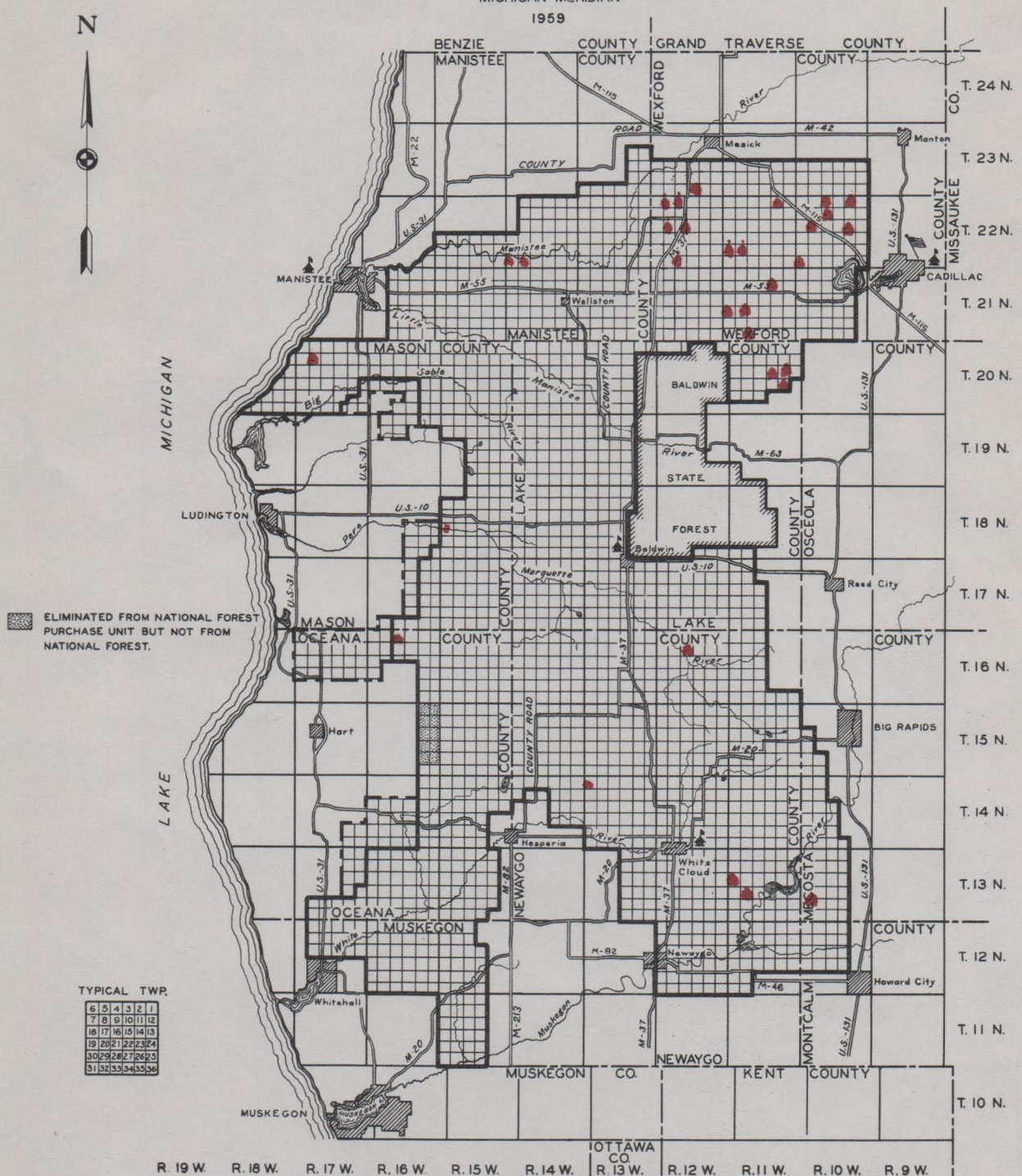
MANISTEE NATIONAL FOREST
AND
PURCHASE UNIT

MICHIGAN

MANISTEE, WEXFORD, MASON, LAKE, OCEANA, NEWAYGO,
MECOSTA, MUSKEGON, AND MONTCALM COUNTIES

MICHIGAN MERIDIAN

1959



ELIMINATED FROM NATIONAL FOREST PURCHASE UNIT BUT NOT FROM NATIONAL FOREST.

TYPICAL TWP.

6	5	4	3	2	1	
7	8	9	10	11	12	
18	17	16	15	14	13	
19	20	21	22	23	24	
30	29	28	27	26	25	
31	32	33	34	35	36	

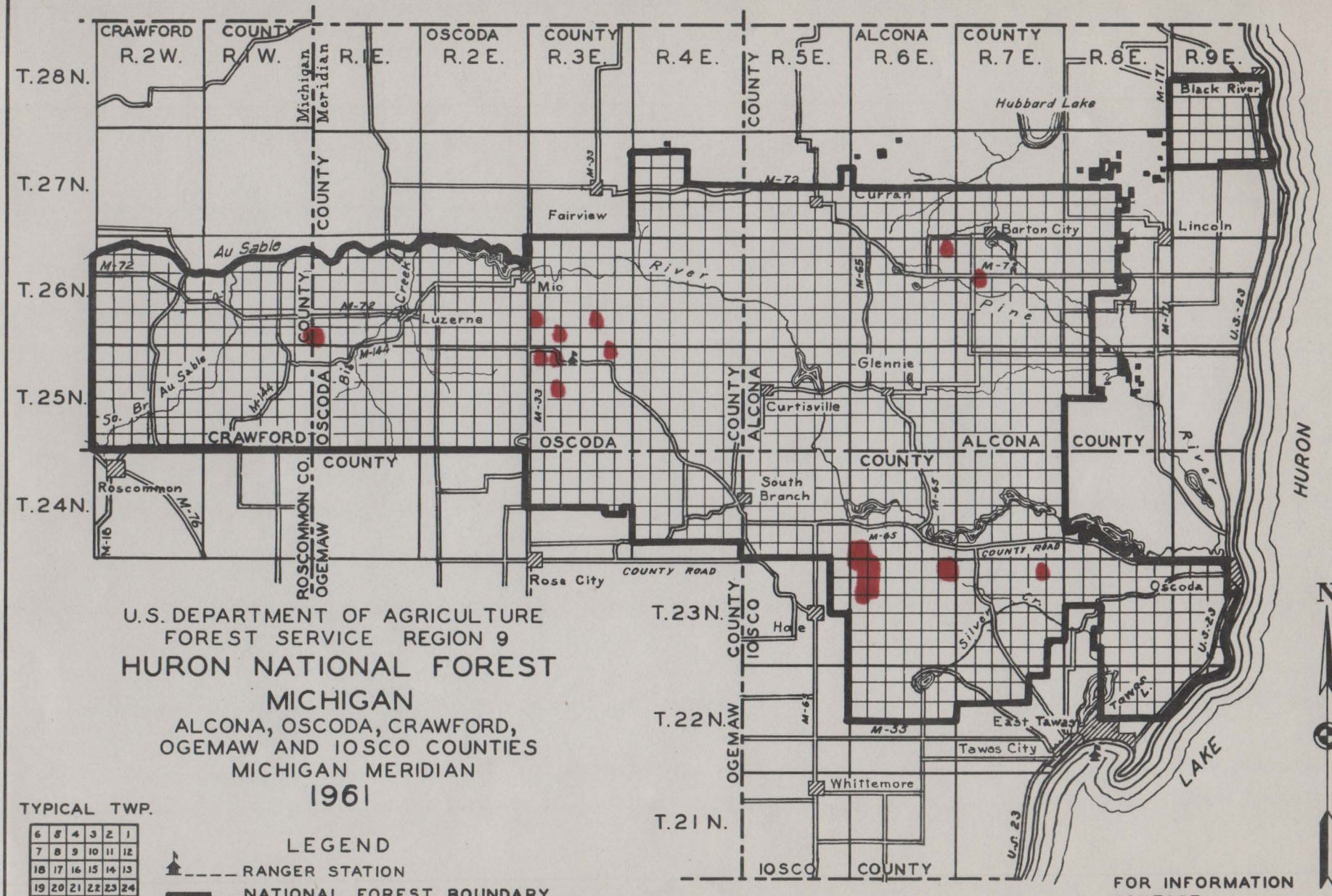
SCALE: ONE SMALL SQUARE EQUALS ONE SQUARE MILE.

LEGEND

- RANGER STATION
- SUPERVISOR'S OFFICE
- NATIONAL FOREST BOUNDARY
- PURCHASE UNIT BOUNDARY
- MAIN HIGHWAYS
- BARK BEETLE DAMAGE, 1966

FOR INFORMATION CONTACT
FOREST SUPERVISOR
U.S. FOREST SERVICE
CADILLAC, MICHIGAN

USDA-SCS-MILWAUKEE, WIS. 1959



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE REGION 9

HURON NATIONAL FOREST
MICHIGAN

ALCONA, OSCODA, CRAWFORD,
OGEMAW AND IOSCO COUNTIES
MICHIGAN MERIDIAN
1961

TYPICAL TWP.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

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CADILLAC, MICHIGAN

USDA-SCS-MILWAUKEE, WIS. 1961

Figure 1. *Ips pini* on young red pine on good site. Nearest pine cutting 9 mi. away. T26N, R7E, Sec. 19, NW¼.

Figure 2. *I. pini* pocket in sapling red pine. Nearest cutting 1 mi. away. T25N, R1E, Sec. 19.

Figure 3. Scattered I. pini pockets in pole size red pine near Welcome Lake, Tawas R.D.

Figure 4. Close-up of I. pini pocket near Welcome Lake, Tawas R.D.

LITERATURE REFERENCES

Craighead, F. C. 1960. Insect Enemies of Eastern Forests. U. S. Dept. Agric. Misc. Publ. No. 657: 333-336.

Graham, S. A. and F. B. Knight. 1965. Principles of Forest Entomology. 4th Edition, McGraw-Hill Book, Co. 327-332.

Thomas, J. B. 1961. The Life History of Ips pini (Say) (Coleoptera: Scolytidae). Canad. Ent. 93: 384-390.